IS 11297-3-1 (1988): Varnished fabrics for electrical purposes, Part 3: Specifications for individual materials, Section 1: Glass fabric backed varnished fabrics [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]

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Indian Standard

(Reaffirmed 2005)

SPECIFICATION FOR VARNISHED FABRICS FOR ELECTRICAL PURPOSES

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 1 Glass Fabric Backed Varnished Fabrics

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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0. FOREWORD

0.1 This Indian Standard (Part 3/Sec 1) was adopted by the Bureau of Indian Standards on 25 May 1988, after the draft finalized by the Solid Electrical Insulating Materials Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard is being brought out in a series of standards on varnished fabrics for electrical purposes. The series will cover the following in various parts:

a) Definitions and general requirements (Part 1),
b) Methods of test (Part 2), and
c) Specifications for individual materials (Part 3).

0.3 This standard (Part 3/Sec 1) covers the requirements of glass fabric backed varnished fabrics.

0.4 Varnished cotton cloth and tape for electrical purposes are, at present covered in IS : 3352-1965*. With the publication of relevant specifications for these tapes in the above series, this standard will be withdrawn.

0.4.1 Synthetic resin bonded glass-fibre (SRBGF) sheets for electrical purposes are covered by IS : 10192-1982*.

0.5 Varnished fabrics comprising bases woven from cotton, natural silk or synthetic fibre (including glass) supplied in the form of full width rolls, sheets or tapes slit to various widths are covered in this standard. In selecting the varnished fabric most suitable for a particular purpose, the following factors should be considered:

a) Operating temperature range,
b) Electrical requirements, and
c) Tensile strength.

0.6 In preparing this standard, assistance has been derived from IEC Doc: 15C (Central Office) 159 ' Specification for varnished, fabrics for electrical purposes Sheet 2 glass fabric backed varnished fabrics ', issued by the International Electrotechnical Commission (IEC).

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Specification for varnished cotton cloth and tape for electrical purposes.

*Specification for synthetic resin bonded glass fibre (SRBGF) sheets for electrical purposes.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part 3/Sec 1) contains the requirements for glass fabrics with varnishes based on the following resins:

a) Epoxy-glass fabric base, EP/G;
b) Polyurethane-glass fabric base, PUR/G; and
c) Silicone-glass fabric base, SI/G.

2. GENERAL REQUIREMENTS

2.1 The material shall conform to the requirements given in Part 1 of this standard on varnished fabrics for electrical purposes.

2.2 The central values obtained shall be equal to or greater than the values given in Table 1.

2.3 The material shall also meet the following requirements unless otherwise specified in Table 1.

2.3.1 *Thickness* — When tested in accordance with 3 of Part 2 of this standard, the thickness shall meet the requirements within the tolerance specified in Table 1 of A and B type of material.

2.3.2 *Tensile Strength and Extension* — When tested in accordance with 6 of Part 2 of this standard, the tensile strength, elongation at break and stress at 10 percent extension, requirements shall be not less than those specified in Table 1.

2.3.3 *Edge Tearing Resistance* — When tested in accordance with 8 of Part 2 of this standard, the edge tearing resistance shall not be less than that given in Table 1.

TABLE 1 REQUIREMENTS OF PUR/G, EP/G AND SI/G TYPES OF VARNISHED FABRICS FOR ELECTRICAL PURPOSES

(*Clauses* 2.2, 2.3, 2.3.1, 2.3.2, 2.3.3, 2.3.4.1, 2.3.4.2, 2.3.4.3, 2.3.4.4 *and* 2.3.5)

Sl No.	Properties Tested According to IS : 11297 (Part 2)-1988	Nominal Thickness									
		0·10 Style		0·12 Style		0·15 Style		0·20 Style		0·25 Style	
		A*	B*	A	B	A	B	A	B	A	B
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	Thickness tolerance in mm	±0·01	±0·01	±0·012	±0·012	±0·015	±0·015	±0·02	±0·02	±0·025	±0·025
ii)	Tensile strength in N/10 mm, *Min*										
	a) Straight										
	1) Warp direction	90	70	110	90	130	100	180	110	230	120
	2) Weft direction	50	40	70	50	80	60	120	70	160	80
	b) Bias cut — Normal	60	40	70	60	80	65	100	70	160	80
	c) Bias cut — Joins	20	20	25	25	30	30	35	35	35	35
iii)	Stress at 10% extension in N/10 mm bias cut	3—10	2—12	3—11	2—12	4—12	3—15	5—15	4—16	6—18	5—20
iv)	Elongation at break in %, *Min*										
	a) Straight cut	1·5	1·5	1·5	1·5	2·0	2·0	2·5	2·5	3	3
	b) Bias cut	15	15	15	15	15	15	20	20	20	20
v)	Edge tear resistance in N, *Min*										
	a) Straight cut warp threads torn	7	5	8	6	10	7·5	15	20	30	25
	b) Bias cut	50	50	70	60	90	75	110	90	140	120
vi)	Electric strength in kV, *Min*										
	a) At room temperature	4·5	5·0	5·0	6·0	6.0	7·0	7·0	8·0	8·0	9.0
	b) At elevated temperature†										
	PUR/G and EP/G	2·5	2·5	3·0	3·0	3·5	3·5	4·0	4·0	4·0	4·5
	SI/G	2·0	2·0	2·4	2·5	2·6	3·0	2·8	3·0	3·0	3.5
	c) Of 3% extended material										
	For bias cut PUR/G and EP/G	2·5	3·0	3·0	3·0	3·5	4·0	4·0	6·0	4·5	5.0
	For bias cut SI/G	2·5	3·0	2·5	2·5	3·0	3·5	2·5	3·5	2·5	3.5
	d) After conditioning 93% R/H										
	For PUR/G and EP/G	2·1	2·5	2·2	2·5	2·3	3·0	2·4	2·8	2·5	3.0
	For SI/G	1·8	2·0	2·0	2·2	2·5	2·8	2·8	3·0	3·0	3.5

*All requirements for a particular fabric are to be taken from one column, either style A or B. Columns A and B reflect differences in properties dependent on variations in the style of the base. Fabrics used in A styles are generally woven from coarser yarn than in B styles and are usually characterized by more open weave construction.

†Elevated temperature for PUR/G=140°C, for EP/G=150°C and for SI/G=180°C.

2.3.4 *Electric Strength*

2.3.4.1 *Electric strength at room temperature* — When tested in accordance with **9.3.1** of Part 2 of this standard, the electric strength at room temperature shall not be less than the values given in Table 1.

2.3.4.2 *Electric strength at elevated temperature* — When tested in accordance with **9.3.2** of Part 2 of this standard, the electric strength shall not be less than the values given in Table 1.

2.3.4.3 *Electric strength of extended material* — The electric strength of the extended material when tested in accordance with **9.3.3** of Part 2 of this standard, shall not be less than that given in Table 1.

2.3.4.4 *Electric strength after conditioning at 93 percent relative humidity for 96h at 27°C* — When tested in accordance with **9.3.5** of Part 2 of this standard, the values shall not be less than those given in Table 1.

2.3.5 *Thermal Endurance* — When tested in accordance with **10** of Part 2 of this standard, the requirements should be within the values given in Table 1.

2.3.6 *Optional Tests* — Following tests may be carried out in accordance with relevant clause of Part 2 of this standard, as agreed to between the purchaser and the supplier.

2.3.6.1 *Effect of fabric on oil* — This requirement shall be applicable when not otherwise stated in the agreement between the supplier and the purchaser.

2.3.6.1.1 When tested in accordance with **4** of Part 2 of this standard, the acid number shall not be greater than 1·0.

2.3.6.2 *Effect of oil on varnished fabric* — Testing in accordance with **5** of Part 2 of this standard, no thickness, transfer of varnish or substantial swelling shall be observed.

2.3.6.3 *Resistance against hydrolysis* — When tested in accordance with **11** of Part 2 of this standard, the material shall show no failure.

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